A Cooperative Approach to Lab-Based, Multi-Team Courses in an iSchool

Carlos E. Caicedo
University of Pittsburgh
135 N. Bellefield Avenue
Pittsburgh, PA 15260
+1 412 624 9490
ccaicedo@sis.pitt.edu

Aylin Aksu
University of Pittsburgh
135 N. Bellefield Avenue
Pittsburgh, PA 15260
+1 412 624 9490
aaksu@sis.pitt.edu

Walter Cerroni
University of Bologna
via Venezia, 52
47023 Cesena (FC) - ITALY
+39 0547 339209
walter.cerroni@unibo.it

ABSTRACT

The iSchool at the University of Pittsburgh has designed a new learning experience that will allow future leaders of the iProfession to gain critical skills and to experience working in culturally diverse teams. The iSchool has, as one of its mission-critical goals, to create learning experiences that imitate the collaborative nature of the information professions. To provide this opportunity and following the advice from industry experts, our iSchool redesigned the laboratory for teaching and learning computer networking topics to support hands-on lab experiences for students as well as the research activities of the iSchool faculty. However, it goes beyond mere workstations in a lab space – it is an experiment to create a multi-team environment that facilitates cooperative approaches to problem solving. It also requires the students to participate in self-directed learning.

This poster presentation reports how the lab and accompanying courses were designed to address a key aspect in working in the information field – *how to work as a team to solve a problem.* Although the iSchool created this lab as part of its graduate program in Telecommunications, the pedagogical aspects of the lab and curriculum design would be applicable to any discipline within the information field.

In 2007, the iSchool's Industry Advisory Council recommended that the laboratory infrastructure used to teach computer networking concepts needed to be completely redesigned. The requirements set forth by the advisory council stated that the labs should engage students in the use of both current networking technologies and those to be used in future work environments. The iSchool took this opportunity to not only redesign the lab, but to completely reconceptualize the curriculum and the physical lab layout to support a different kind of teaching methodology and learning experience. A distributed laboratory infrastructure was implemented, to achieve an effective teaching environment for lab-based, multi-team courses that enables cooperative interaction among the students. This design replaced the existing centralized layout of the lab, which only allowed one group of students to work at a time, and helped the integration of isolated laboratory experiences from many courses into a single, coherent lab course.

The iSchool retained the services of an international visiting faculty member who had already developed an innovative lab-based networking experience for students in his own country. The iSchool's laboratory will primarily be used for a new networking laboratory course required for graduate students and offered as an optional senior elective for undergraduate students.

Our iSchool acknowledges the importance of having IS professionals that can work in teams with people from different backgrounds and nationalities; thus, the design of the lab course incorporates these aspects into its structure. The iSchool has a diverse student population and in this direction the lab experiences promote the interaction of student teams comprised of people of different nationalities. In this environment, students have to adopt communication styles appropriate for the interactions of future information professionals in a globalized world.

More specifically, the objective of this lab-based course is to provide the students with experience on computer networking topics through hands-on experiments using equipment and services in lab exercises that promote team-work. During the course, students will progress with a bottom-up methodology through increasingly-complex networking concepts, from basic connections between two PCs to routing to advanced network applications. Each lab experience is NOT a stand-alone experience: rather they are structured to incorporate concepts and knowledge gained by the students in previous exercises. The course covers topics such as connectivity at the physical layer, Ethernet and WLAN performance and management, IP address planning and management, routing protocols, network monitoring and management, signaling protocols for VoIP services, and web-based services configuration.

In order to promote critical thinking and foster problem solving skills, the exercises do not force the students to follow a recipe-like step-by-step approach. There are no lectures in the course and the students are supposed to apply the knowledge gained from previous theoretical courses, integrated with some specific suggested readings. Furthermore, the requirements for each exercise are presented as a statement of goals to accomplish. This mimics the environment that students will deal with in their profession where they have to do their own research and use their expertise to solve problems, meet goals and elaborate appropriate

reports while respecting deadlines. Additionally, the course requires students to specify and undertake a final project which emphasizes self-driven research and problem solving.

State-of-the-art devices were acquired in order to support these lab exercises, but that were also in line with the pedagogical objectives of the lab. The lab facility provides for four independent workbenches accommodating four students each. Each workbench has 3 PCs, one laptop and a networking equipment rack. This will allow students at each workbench to work together on the assigned problem or design –allowing them to experience the team approach to problem-solving that exists in industry. An extra equipment rack in the lab provides interconnectivity between the four workbenches; thus, allowing for complex lab exercises where separate teams have to interact.

To support the self-driven approach to learning and problem solving in this course, the instructor only acts as a supervisor and a consultant. As a supervisor, he/she demands and expects the completion of the objectives of each assignment within an agreed time schedule; however, each team is free to structure the presentation of results and the level of detail provided. As a consultant, the instructor provides guidance towards finding the solution to practical problems a student might encounter during a lab experiment.

iSchools should give their students more than technical skills and theoretical knowledge. They should enable the student to experience and master working in an environment that is ever-changing, diverse and relatively unstructured. Our iSchool has developed and implemented a lab-based course that will encourage team approaches to problem solving, self-directed learning, and appropriate communication capabilities for working in a culturally-diverse setting. We hope our experience can be useful to other iSchools in the development of courses and infrastructure with similar objectives.

Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer and Information Science Education – *Information Systems Education*

General Terms

Design, Experimentation

Keywords

Team-based experimentation, self-directed learning, laboratory and curriculum development.